Biomass and Alternative Methane Fuel Resources

FEMP's Biomass and Alternative Methane Fuels (BAMF) Super ESPC can help Federal agencies take advantage of abundant local, renewable resources.

BAMF Resource Fact Sheet

Many Sources of Biomass and Alternative Methane Fuels are Close to Federal Facilities

Biomass fuels include any organic matter that is available on a renewable or recurring basis (excluding old-growth timber), such as dedicated energy crops and trees, agricultural food and feed crop residues, aquatic plants, wood and wood residues, animal wastes, and other waste materials. Alternative methane fuels include landfill methane, wastewater treatment digester gas, and coalbed methane.

Biomass and alternative methane fuels can be used in applications such as steam boilers, hot water heaters, engine generation sets, and gas turbines. Such fuels are used in many combined cooling, heating, and power (CHP) systems.

A new resource assessment has identified nearly 4,500 sources of renewable biomass and alternative methane fuels located in close proximity to a large Federal facility. The proximity of these resources make them likely candidates for economically replacing conventional fuels at these facilities. The Biomass and Alternative Methane Fuels Super Energy Savings Performance Contract (BAMF Super ESPC) can help Federal agencies develop and finance projects to take advantage of these local resources to cut energy costs and meet federal goals for increasing the government's use of renewable energy.

The resource assessment and data base were developed for the Federal Energy Management Program (FEMP) by the National Energy Technology Laboratory (NETL), in collaboration with the Pacific Northwest National Laboratory and the U.S. Environmental Protection Agency (EPA). The assessment has focused initially on three resources that are expected to be major contributors to federal BAMF projects—wood waste, landfills, and wastewater treatment plants. Biomass waste and residues rather than virgin biomass offer the most compelling energy cost savings compared to conventional fuels, because waste products often cost little or nothing, except for transportation, and may even have a negative cost if you consider avoided landfill tipping fees. Waste-to-energy projects can also prevent the destructive environmental effects that agriculture and municipal wastes can have on streams and aquifers.

Wood Wastes

Huge quantities of wood residues from manufacturing, construction, demolition, and used containers are disposed in landfills and could be used for fuel instead. Wood can be used in many of the same energy applications as coal and has the environmental advantages of producing lower emissions and less ash, and contributing less to global warming than coal. The assessment identified over 800 large Federal facilities and nearly 2,300 raw wood processors that are within 50 miles of ezch other, close enough to keep transportation costs reasonably low.

Wood chips are a good source of biomass for BAMF Super ESPC projects.

Landfill Gas

Landfills produce bio-gas as organic wastes decompose. This gas consists of about half methane (the primary component of natural gas), about half carbon dioxide, and a small amount of non-methane organic compounds. Instead of flaring landfill gas or allowing it to escape into the air, it can be captured, converted, and used as an energy source. Capturing and using landfill gas also prevents methane from migrating into the atmosphere, thus reducing associated odors and contributions to air pollution and global climate change. Municipal solid waste contained in landfills can also be utilized as a biomass feedstock for energy applications. Using data from the EPA's Landfill Methane Outreach Program, the assessment identified over 500 landfills without active landfill projects and nearly 700 Federal facilities that are within 15 miles of each other.

Utilization of renewable resources from biomass, landfills, wastewater treatment plants, and coal seams are key to energy conservation in the future.

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Wastewater Treatment Plants

The anaerobic decomposition process that produces bio-gas can either occur naturally, as in a landfill, or in a controlled environment, such as a bio-gas plant. Wastewater treatment plant digester systems are airtight containers that maintain optimum conditions for quick decomposition of waste materials. Depending on the composition of feedstock and system design, digester bio-gas is typically 55 to 75 percent methane; state-of-the-art systems can produce bio-gas composed of up to 95 percent methane. Wastewater treatment plants also produce sludge which can be used as a fuel source for energy applications.

Data obtained from the EPA's Water Discharge Permit database indicates that over 1,600 wastewater treatment plants and nearly 800 Federal facilities are located within fifteen miles of each other.

Wastewater treatment digester gas can yield methane fuel.

Coalbed and Coal Mine Methane

Other sources of alternative methane fuel are coalbed and coal mine methane. Although a resource assessment has not been performed on this source of methane, many opportunities exist for projects in this area. Coal mine methane refers to methane gas that escapes into the atmosphere when coal is mined. Coalbed methane refers to gas that is trapped inside unmined coal seams. The current practice is to vent coal mine methane to the atmosphere.

Data from the EPA Coalbed Methane Outreach Program indicates that nearly 250 million cubic feet per day of methane is emitted from 400 of the highest emitting coal mines in the United States. Because methane is more than 20 times more effective than carbon dioxide in trapping heat within the Earth's atmosphere, it is a significant potential contributor to climate change. While a dozen or so of the nation's largest emitting underground coal mines do collect and make use or sell most of their released gas, many smaller mines with lower amounts, though still significant methane emissions, make little effort to recover this resource.

Is There a BAMF Opportunity in Your Backyard?

FEMP is making the energy- and cost-saving benefits of Biomass and Alternative Methane Fuels (BAMF) accessible to Federal facilities through the Super Energy Savings Performance Contract (ESPC) mechanism, which enables agencies to reduce their energy costs without using congressional appropriations for capital improvements.

To find out more about the opportunities for turning waste to energy using the BAMF Super ESPC, visit the FEMP web site at www.eren.doe.gov/femp/financing/espc/biomass.html, or please contact the FEMP representative at the DOE Regional Office for your area, or one of the following people:

Christopher Abbuehl
National Biomass and Alternative Methane Fuel (BAMF) Program Representative
DOE-Philadelphia Regional Office
Phone: 215-656-6995
Email: Christopher.abbuehl@ee.doe.gov

P. Steven Cooke
BAMF Technical Lead
National Energy Technology Laboratory
Phone: 304-285-5437
Email: steve.cooke@netl.doe.gov

Danette Delmastro
Super ESPC Program, BAMF Project Lead
Federal Energy Management Program
Phone: 202-586-7632
Email: danette.delmastro@ee.doe.gov

FEMP Help Desk:
800-DOE-EREC
(363-3732)
Internet:
http:/www.eren.doe.gov/femp

Produced for the U.S. Department of Energy by the National Energy Technology Laboratory

October 2002